

What is claimed is:

1. An optical structural body formed by irradiating, to a laser light transmitting substrate, a single condensed pulse laser light beam having an energy amount causing a photoinduced 5 change in refractive-index, thereby to form, at the light condensing position, a region having a periodic structure in which high refractive-index zones and low refractive-index zones are repeatedly being generated.

10 2. An optical structural body according to Claim 1, wherein principal planes of the periodic structure defined as the planes in which the high refractive-index zones or the low refractive-index zones are being joined to one another, are formed in parallel to the polarized magnetic field direction 15 of the irradiated pulse laser.

3. An optical structural body according to Claim 1, wherein the pitches in the periodic structure are formed in dependence on the wavelength of the irradiated pulse laser, the 20 number of irradiated pulses or the pulse energy.

4. An optical structural body according to Claim 1, wherein the pitches in the periodic structure are 1 μm or less.

25 5. An optical structural body according to Claim 1,

wherein the region having the periodic structure is spherical.

6. An optical structural body according to Claim 5,
wherein the diameter of the spherical body is in the range of
5 0.1 μ m to 1 mm.

7. An optical structural body according to Claim 1,
wherein the region having the periodic structure is in the form
of a cord having a circular section, or in the form of a column.

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8. An optical structural body according to Claim 1,
wherein a plurality of regions each having the periodic
structure are repeatedly formed at regular intervals.

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9. An optical structural body according to Claim 8,
wherein the predetermined intervals are in the range of 1 μ
m to 1 mm.

10. An optical structural body according to Claim 1,
20 wherein the region having the periodic structure is formed in
an isotropic material which originally presents no
birefringence phenomenon.

11. An optical structural body manufacturing method

comprising the steps of:

irradiating, to a laser light transmitting substrate, a single condensed pulse laser light beam having an energy amount which causes a photoinduced change in refractive-index; and
5 forming, at the condensing position, a region having a periodic structure in which high refractive-index zones and low refractive-index zones are repeatedly being formed.

12. An optical structural body manufacturing method
10 according to Claim 11, wherein the pulse width of the pulse laser light is in the range of $10^{-12} \sim 10^{-15}$ seconds.

13. An optical structural body manufacturing method according to Claim 11, wherein the pulse repetition frequency
15 of the pulse laser light is not greater than 100 MHz.

14. An optical structural body manufacturing method according to Claim 11, wherein the pulse of the pulse laser light is a single pulse.

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15. An optical structural body manufacturing method according to Claim 11, wherein the power density of the pulse laser condensed on the substrate, is not less than 10^8W/cm^2 .

25 16. An optical structural body manufacturing method

according to Claim 11, wherein the pulse energy of the pulse laser condensed on the substrate, is in the range of 0.1 μ J/pulse to 10 μ J/pulse.

5 17. An optical structural body manufacturing method comprising the step of condensing pulse laser on a glass substrate to utilize interference of the pulse laser with plasma generated inside of the condensing position, thus forming a region having a periodic structure in which high
10 refractive-index zones and low refractive-index zones are being repeatedly formed.

18. An optical element characterized in that there is utilized, as a polarizer, a diffraction grating, a reflector, a filter or an optical attenuator, an optical structural body formed by irradiating, to a laser light transmitting substrate, a single condensed pulse laser light beam having an energy amount causing a photoinduced change in refractive-index, thereby to form, at the light condensing position, a region having a periodic structure in which high refractive-index zones and low refractive-index zones are repeatedly being generated.

19. An optical element characterized in that light of

wavelength division multiplex is incident upon a region having a periodic structure of an optical structural body, thereby to increase the reflectance of a specific wavelength in dependence on the periodic structure, the optical structural body being 5 formed by irradiating, to a laser light transmitting substrate, a single condensed pulse laser light beam having an energy amount causing a photoinduced change in refractive-index, thereby to form, at the light condensing position, the region having the periodic structure in which high refractive-index 10 zones and low refractive-index zones are repeatedly being generated.